

## Dyslexia and Neurofeedback Summary

**Summary:** In cases of dyslexia, there is most likely an inherent deficit of activation in the left hemisphere coinciding with an excess of activation in the right hemisphere, as well as a lack of communication between specific regions of the left hemisphere. Additionally, there may also be an increase of slow wave activity in the frontal lobe.

### Affected areas according to:

1. Thornton & Carmody, 2005 <http://www.brainm.com/software/pubs/brain/ThorntonCAPCNA2005.pdf>  
-The **left temporoparietal** (T5, P3) region is disrupted in developmental dyslexia. The magnitude of activation is low, and there is decreased coordination of activity between the **left superior temporal gyrus** (T3) and the **left frontal areas.**" (F7, F3)
  1. "disruption is in place before children learn to read"
  2. "related to difficulties with phonologic processing"
  3. "related to underdevelopment of white matter fibers in the region"
2. Breteler, Arns, Peters, Giepmans, & Verhoeven, 2010  
[http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2837193/pdf/10484\\_2009\\_Article\\_9105.pdf](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2837193/pdf/10484_2009_Article_9105.pdf)  
-Decreased beta in **right Parietal & Occipital** when reading (P4, O2) Increased slow wave in frontal  
-Increased slow wave activity in **right temporal** (T4, T6)  
-Increased beta1 in **left frontal** (F7, F3)  
-Increased coherence in **frontal, central, & temporal**
3. Walker & Norman, 2006 <http://www.neurotherapydallas.net/UserFiles/File/Dyslexia.pdf>  
-**Left superior temporal gyrus** (T3) - Integrating auditory, visual, perceptual & memory inputs in order to accomplish fluent reading, & association of word comprehension (encompassing phonemic, lexical, & Semantic representations)  
-Increased beta at **Left Temporal** (T3)  
-**Left inferior frontal gyrus** (F7)  
-**Left temporoparietal cortex** (T3, P3, T5)  
-Hypoactivation of **Left frontal, temporal, & parietal regions**, more specifically (T3, P3, T5)
4. Schummer, 2008 <http://www.resourcenter.net/images/AAPB/Files/Biofeedback/2008/biof-36-04-157-162.pdf>  
-Disconnection Syndrome - the information transfer between parts of the brain is interrupted/blocked  
-Disconnection between Broca's Area (F3, F7) & Wernicke's Area (P3)

### Training suggestions:

1. Walker & Norman, 2006  
-Downtrain significant abnormalities that are increased  
-Uptrain significant abnormalities that are decreased  
-Increase 16-18Hz at T3
2. Breteler, Arns, Peters, Giepmans, & Verhoeven, 2010  
-Hyperactivation trained down at T4, T6, Fz, &/or F3  
-Trained coherence down most often between T3/T4 &/or F7/C3